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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/897,843	07/02/2001	Nicolai Kosche	03226.105001; P5810	1070

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EXAMINER

VU, TUAN A

ART UNIT	PAPER NUMBER
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2124

DATE MAILED: 11/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/897,843

Applicant(s)

KOSCHE ET AL.

Examiner

Tuan A Vu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 July 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9, 12, 14-22 and 25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9, 12, 14-22 and 25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. This action is responsive to the Applicant's response filed 7/28/2004.

As indicated in Applicant's response, claims 1, 3, 5-9, 12, 14, 16, 20-22, and 25 have been amended and claims 10, 11, 13, 23, 24, and 26-32 canceled. Claims 1-9, 12, 14-22, and 25 are pending in the office action.

Claim Rejections - 35 USC § 101

2. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

3. Claims 1 and 14 rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

The Federal Circuit has recently applied the practical application test in determining whether the claimed subject matter is statutory under 35 U.S.C. § 101. The practical application test requires that a "useful, concrete, and tangible result" be accomplished. An "abstract idea" when practically applied is eligible for a patent. As a consequence, an invention, which is eligible for patenting under 35 U.S.C. § 101, is in the "useful arts" when it is a machine, manufacture, process or composition of matter, which produces a concrete, tangible, and useful result. The test for practical application is thus to determine whether the claimed invention produces a "useful, concrete and tangible result".

As per claim 1, this claim recites a method for improving branch prediction rates comprising processing a case, in response to detection of a branch instruction, determining the next case from a sequence, where the next case is one of a plurality of cases; and processing the next case. The very acts of processing a case after detecting a branch instruction; determining and then processing a next case being one of many other cases involved in some sequence amount to no specific useful result expected from the method as called for in the preamble. Further, the steps of determining a case from the knowledge of a branch instruction and

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processing the case therefrom can be done mentally without any computer apparatus. In other words, the claim though elaborating more specifics in describing each action step fails to describe any resulting effect or act suggesting a tangible achievement, i.e. absent any concrete, tangible and useful result, the claim fails to requirements of the practical test and amounts to no more than abstract idea, hence is rejected for leading to a non-statutory subject matter.

Claim 14 is an apparatus claim corresponding to claim 1 and exhibits the same defect that fails the practical application test, i.e. the fact of processing after determining which case to process does not convey any teachings or concrete suggestion that would lead to an useful result in the art of branch prediction and program optimization. Thus, the claim amounts to a mere abstract idea and is rejected as non-statutory subject matter.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Note: 35 U.S.C. § 102(e), as revised by the AIPA and H.R. 2215, applies to all qualifying references, except when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. For such patents, the prior art date is determined under 35 U.S.C. § 102(e) as it existed prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. § 102(e)).

5. Claims 1-9, 12, 14-22, and 25 are rejected under 35 U.S.C. 102(e) as being anticipated by Maslennikov et al., USPN: 6,412,105 (hereinafter Maslennikov).

As per claim 1, Maslennikov discloses a method for improving branch prediction rates in a microprocessor comprising:

processing a case (e.g. *identify most probable alternatives of the switch* - Fig. 1) in response to detection of a branch instruction (e.g. *multi-way branch* – col. 4, lines 1-21);

determining a next case from a sequence involving the processed case (e.g. *continue for each most probable alternative, determine most probable subset* – Fig. 1 – Note: from subsets of alternatives determining the most probable alternative reads on determining next case from a plurality of cases until all probable alternatives processed) wherein the next case corresponds to one of the plurality of cases; and

processing the next case (e.g. *determine most probable alternative..., leave a copy of the alternative as one of the alternatives in the switch statement* – Fig. 1).

As per claim 2, Maslennikov discloses processing based on probability (e.g. col. 4, lines 22-63; col. 9, lines 18-49)

As per claim 3, Maslennikov discloses determining the next case and processing it during processing one initial case of the plurality of cases (e.g. *continue for each most probable alternative, determine most probable subset* – Fig. 1)

As per claim 4, Maslennikov discloses a sequence from profile information (e.g. col. 3, lines 22-35; col. 5, line 50 to col. 6, line 19)

As per claim 5, Maslennikov discloses determining 2nd case from sequence and processing 2nd case (e.g. Fig. 1 – Note: processing alternative in sequential iteration and its subset of probability characteristics until all the alternative cases are processed reads on determining 2nd case from sequence of cases while processing 2nd case).

As per claim 6, Maslennikov discloses processing the next case being selective based on an associated probability (e.g. col. 5, line 50 to col. 6, line 19)

As per claim 7, Maslennikov discloses determining 2nd next case and processing it during processing one of the plurality of cases (Fig. 1 – see rationale of claim 5)

As per claim 8, Maslennikov discloses that the case and the next case are branch instructions (e.g. col. 4, lines 1-21; col. 6, line 39 to col. 8, line 50 – Note: each instruction based on some profile or condition so to effect a jump to case/if-else block reads on branch instruction)

As per claim 9, Maslennikov discloses a method of improving a prediction rate for instructions in code comprising:

determining a sequence from profile information (e.g. *determine most probable alternative...*, *leave a copy of the alternative as one of the alternatives in the switch statement* Fig. 1; col. 5, line 50 to col. 6, line 19); and

transforming the code based on the determined sequence (e.g. move out of the switch statement – Fig. 1; col. 7 line 11 to col. 8, lines 16 – Note: set up instrumentation counters for edges and *goto* statements reads on transforming based on sequence of cases and profile information subjected to processing);

wherein the determined sequence comprises a set of cases to be selectively processed after processing one of a plurality of cases (e.g. *continue for each most probable alternative, determine most probable subset* – Fig. 1 -Note: processing alternatives in sequential iteration and its subset of probability characteristics until all the alternative cases are processed reads on set of cases selectively processed after processing one of the cases among a plurality of cases) in response to detection of a branch instruction (e.g. col. 4, lines 1-21), and

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wherein each case in the set of cases corresponds to one of the plurality of cases (e.g. *continue for each most probable alternative, determine most probable subset* – Fig. 1 - Note: processing alternatives in sequential iteration and its subset of probability characteristics until all the alternative cases are processed reads on set of cases selectively processed after processing one of the cases among a plurality of cases).

As per claim 12, Maslennikov discloses an apparatus for improving branch prediction rates in a microprocessor comprising:

a compiler with a optimization component (e.g. col. 6, lines 26-38),

wherein such component determines a sequence from profile information, and

transforms code received by the compiler based on the determined sequence; and wherein the determined sequence comprises a set of cases to be selectively processed after processing one of a plurality of cases in response to detection of a branch instruction, and

wherein each case in the set of cases corresponds to one of the plurality of cases;

all such limitations exactly corresponding to those recited and addressed in claim 9 above.

Hence, these limitations are rejected using the corresponding rejections as set forth therein.

As per claim 14, Maslennikov discloses a software tool for improving branch prediction rates in a microprocessor comprising: a program stored on a computer-readable media for processing the same steps limitations as recited in claim 1. Hence, this claim is rejected with the corresponding rejection as set forth in claim 1.

As per claim 15, this claim corresponds to claim 6, hence is rejected with the corresponding rejection as set forth therein.

As per claims 16-21, refer to claims 3-8, respectively.

As per claim 22, Maslennikov discloses a software tool for improving a prediction rate for instructions in code comprising a computer-readable stored program for performing the same step limitations as recited in claim 9. Hence, this claim is rejected with the corresponding rejection as set forth in claim 9.

As per claim 25, Maslennikov discloses an apparatus for improving branch prediction rates in a microprocessor comprising means for:

determining a sequence (e.g. *determine most probable alternative* - Fig. 1; col. 5, line 50 to col. 6, line 19 – Note: using probabilistic profiling information to determine what alternative to process reads on determining a sequence from detecting a switch statement); and

transforming the code based on the sequence (e.g. *move out of the switch statement* – Fig. 1; col. 7 line 11 to col. 8, lines 16 – Note: removing instructions or set up instrumentation counters for edges and *goto* statements reads on transforming based on sequence of cases and profile information subjected to processing);

wherein the determined sequence comprises a set of cases to be selectively processed after processing one of a plurality of cases (e.g. *continue for each most probable alternative, determine most probable subset* – Fig. 1) in response to detection of a branch instruction (e.g. col. 4, lines 1-21), and

wherein each case in the set of cases corresponds to one of the plurality of cases (e.g. *continue for each most probable alternative, determine most probable subset* – Fig. 1).

Response to Arguments

6. Applicant's arguments with respect to claims 1-32 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. For more information of such prior art, refer to PTO form 892 for specifics.

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan A Vu whose telephone number is (272)272-3735. The examiner can normally be reached on 8AM-4:30PM/Mon-Fri.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kakali Chaki can be reached on (571)272-3719.

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The fax phone number for the organization where this application or proceeding is assigned is (571)273-3735 (for non-official correspondence – please consult Examiner before using) or 703-872-9306 (for official correspondence) or redirected to customer service at 571-272-3609.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

VAT
November 19, 2004


ANIL KHATRI
PRIMARY EXAMINER